SB761
U7P3
89-6

FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. 89-6

3420 Evaluation
January 9, 1989

EVALUATION OF ANNOSUS ROOT DISEASE AND BARK BEETLE MORTALITY IN A PINE AND OAK FOREST, SAN JACINTO RANGER DISTRICT, SAN BERNARDINO NATIONAL FOREST

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ABSTRACT

Heterobasidion annosum (Fomes annosus) was found in an area west of the Alandale Station, San Jacinto Ranger District. A recently windthrown pine was infected and dead manzanita were present. Mortality from bark beetles occurred in a stand of smaller pines. Management for improvement of wildlife habitat and general stand vigor will have to consider these problems.

INTRODUCTION

An area 100 yards west of the Alandale Station, San Jacinto Ranger District, has a chronic problem of overstory mortality and has incurred a recent blowdown among several large overstory pine. Mortality in smaller pines had occurred nearby. We accompanied Ernest Del Rio, silviculturist, and Kathy Valenzuela, resource officer, to the site on October 31 in order to examine the blowdown.

OBSERVATIONS

The area viewed encompasses the fork in the road approximately 100 m west of the station. An overstory ponderosa pine had fallen parallel with the left fork. Near the root ball was a large (6 ft. x 12 ft. crown width) dead manzanita that was largely denuded of foliage (Fig. 1). South and southeast of

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the windthrown tree was open space about 60 to 75 ft across. On the edge of the opening were two large manzanita that had died more recently -- much of the dead foliage remained attached.

At the back of a cavity within the pine root ball, a large fresh sporophore (conk) of Heterobasidion annosum (Fomes annosus) was found. Conks were not found in stumps to the south and southeast of the left fork, but one small, very old conk was found in the remains of a stump in an opening north of the right fork. The area was logged following World War II, and this would explain the presence of annosus root rot at the site and the remains of conks in disintegrating stumps.

To the northeast beyond the right fork was an open area with several stumps. The dominant vegetation was largely small black oak, Quercus kelloggii, and canyon live oak, Q. chrysolepis. Farther along the right fork to the west was a stand of younger ponderosa pine in which mortality was occurring. The mortality in the younger pine is attributed to the current bark beetle activity present in the general area. This in turn is related to recent dry years and excessive stocking for such climatic stress.

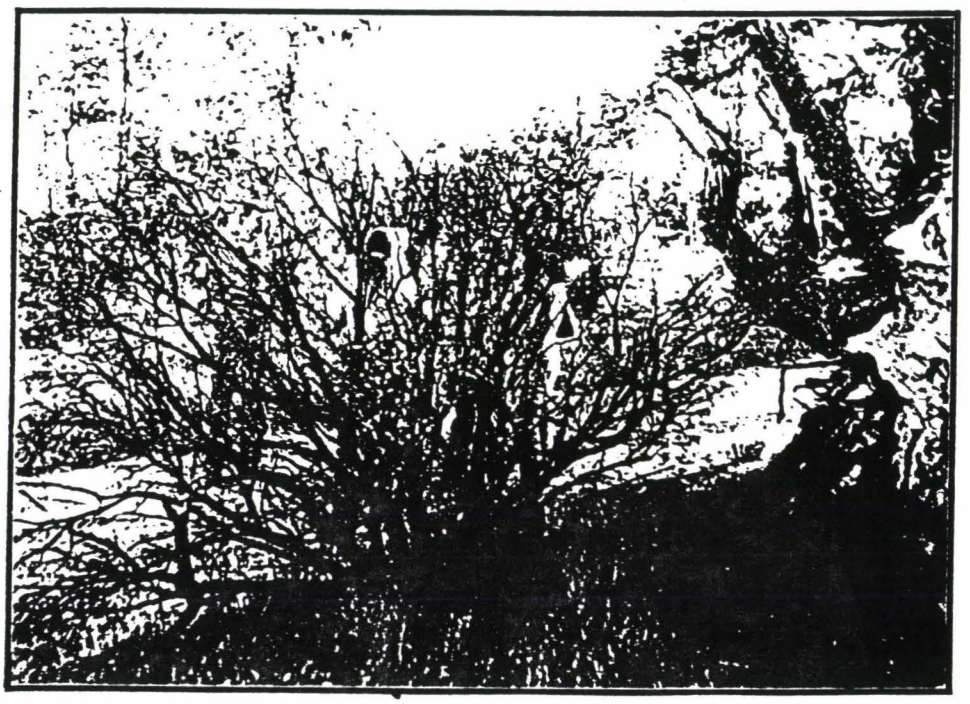

Figure 1. Dead manzanita adjacent to a pine windthrow in which annosus root disease was found.

DISCUSSION

The management objectives for this immediate area are to enhance wildlife habitat by oak management and to improve the general health of the stand through stocking control. The latter would alleviate competitive stress during periods of soil moisture deficit such as the current sequence of droughty years. It would not ensure low levels of tree mortality from attacks by bark beetles, but the probability would be lessened. Figure 2 illustrates relevant relationships found in one area of northern California. Experience and intuition would adjust the relationship for southern California, but the principle is the same -- excessive stocking in pine stands increases the probability of mortality from bark beetles. This is particularly pertinent in areas that also have annosus root disease -- an additional stress.

Exposing the root systems of the large manzanitas was not feasible in the time available. Therefore, positive identification of F. annosus as the pathogen cannot be given. Although it is uncommon to find annosus killing manzanita, it is not unknown, and the presence of the dead plants adjacent to infected pines and along the edges of disease centers indicates that annosus root disease is responsible. The fungus will very likely remain active at this site for decades even with the elimination of the pine within the centers. Thus, the management of the area for wildlife values and oaks, nonhosts for F. annosus, is a very suitable alternative.

MANAGEMENT ALTERNATIVES

1. No Action. Excessive stocking and root disease will provide opportunities for attacks by bark beetles and increase the probability of mortality from these attacks. This will be true particularly in periods of drought. Group kills will develop along droughty ridges, at the edges of disease centers and in overstocked aggregations of pines.

2. Manage for Nonhosts of F. annosus. Black oaks and canyon live oaks were observed at the site. No doubt other oak species such as interior live oak, Q. wislizenii, might be found. These nonhosts could be encouraged by planting root disease centers. Other shrubby wildlife plants would not be susceptible to annosus root disease. Pines planted in any openings without root disease would assist in maintaining a succession of aging pines for use as larders by the acorn woodpecker. Placement of oaks and other nonhosts between root disease centers and uninfected stands might assist in preventing the spread of the pathogen from the center into uninfested pine areas.

Acorns of these species are not difficult to germinate, and planting stock could be generated from local collections. Hardy seedlings can be grown in deep pots in two or three years. Still, survival might well depend on a suitable watering schedule during the first one or two years after planting. This could be done by the fire crew at Alandale Station when not involved in other duties.

Acorns gathered during heavy mast years could be stored at the Placerville Nursery and planted during exceptionally moist winters. Good seedling

production in the spring sometimes occurs naturally in these years, but survival might be problematic.

3. Thin Pine Stands. An ounce of prevention is preportedly worth a pound of cure. This is no less true of overstocked pine stands. The time to thin is before climatic conditions favor success by aggregating bark beetles. Once into a drought cycle, creation of slash and a sudden change in environment by opening the stand might compound the problem and increase short-term susceptibility and the likelihood of attack by bark beetles. Eventually however, all young stands in important management areas will need stocking management to minimize susceptibility to bark beetles. Local knowledge and experience would produce at least a subjective relationship similiar to Figure 2.

Treatment of freshly cut stump surfaces with borax (sodium tetraborate decahydrate, EPA Reg. No. 1624-94) is desireable in those stand sectors were the disease is not present.

4. Combination of 1-3. A combination of two or all of the previous alternatives might optimize the benefits sought for a particular site.

5. Removal of Infected Stumps and Rootballs. Present information does not permit recommending this procedure as a way to reduce the length of time the pathogen remains viable in the soil, particularly in the soils and climatic conditions of Southern California. Should the establishment of oaks prove difficult, and research prove extraction beneficial, this management tool might be applicable to sites within the Alandale area at some ensuing time. The extraction of stumps and rootballs in infection centers, although costly, would then prove beneficial in maintaining overstory diversity.